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GAS ABSTRACTS

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1. GAS INDUSTRY

Plant Amortization

HOW SHOULD OLD GAS PLANT ABANDONMENT LOSSES BE TREATED IN RATE CASES? *Gas*, 29, 52, 54 (1953) May.

When adequate pipeline gas became available, the Wisconsin Natural Gas Company abandoned a coal gas production plant. For accounting purposes, the amortization of the $1,240,000 abandonment loss over a 120-month period was approved by the state public service commission, but there is indecision as to this procedure in rate-making. The commission's chief accountant believes that since conversion saves money for customer as well as company, "there should be some division of charge between investors and rate payers."

A. E. Neumann

Public Relations

White, R. W. BRIGHTON AFTERMATH. *Gas*, 29, 43-46 (1953) May.

Rochester Gas & Electric Corporation's handling of the claims arising from the 1951 tragedy is described. The company's acceptance of responsibility and its fair and prompt dealing with the situation are given credit for the fact that no law suits have been filed against them, and their relations with the public have not suffered. R. F. Bukacek

Replacement Costs

Steinberger, E. A. ORIGINAL COST DEPRECIATION VERSUS REPLACEMENT COST. *Public Utilities Fortn.*, 51, 671-678 (1953) May 21.

Inflation has placed the utility industry in an unfavorable position in regards to their depreciation reserves which are calculated on original cost of equipment. The author recommends a weighted replacement cost figure for use as a basis for calculating a depreciation reserve.

W. G. Bair

Research Cooperation

Cattell, R. A. CITE A.G.A. RESEARCH COOPERATION. *Am. Gas Assoc. Monthly*, 35, 17, 52 (1953) May.

The text of the presentation of the Conservation Service Award of the U.S. Department of the Interior to the American Gas Association at the Transmission and Storage Conference in Chicago, April 30, 1953. R. F. Bukacek

2. APPLIANCES

Appliance Merchandising

Thomas, L. P. 1953 GAS APPLIANCE MERCHANDISING—HOUSTON NATURAL STYLE. Am. Gas J., 178, 69-72 (1953) May.

The Houston Natural Gas Company has cooperated in all ways possible with the appliance dealers in its distribution area. It has financed the purchase of appliances, adding the payments to the gas service bills, and has participated in radio and television advertisements.

E. F. Searight

Burners

Berry, M. F. COMBUSTION CHAMBER FOR GASEOUS FUELS. U. S. 2,638,975 (1953) May 19.

Brierly, R. C. FUEL BURNER DIFFUSER. U. S. 2,638,974 (1953) May 19.

Jones, D. F. (assigned to Motor Wheel Corp.) AIR SHUTTER FOR GAS BURNERS. U. S. 2,638,161 (1953) May 12.

Swindin, N. SUBMERGED FLAME BURNER. U. S. 2,638,895 (1953) May 19.

A submerged flame burner for concentrating liquids using a mixture of liquid hydrocarbons and preheated air for fuel. A. R. Kahn

Vixler, L. F. (assigned to The Patrol Valve Co.) GAS BURNER CAP WITH BRANCHED OUTLET PARTS. U. S. 2,638,976 (1953) May 19.

Winkelman, H. E. and Hinger, R. E. (assigned to National Cylinder Gas Co.) POST-MIX MULTIPLE OUTLET GAS BURNER. U. S. 2,638,159 (1953) May 12.

Clothes Dryers

Turner, C. C. YOU'LL SELL CLOTHES DRYERS IF YOU SELL LEISURE, ECONOMY, DEPENDABILITY, SPEED, CLEANLINESS, FLEXIBILITY. *LP-Gas*, 13, 47, 49, 123-25 (1953) April.

The many advantages of the gas clothes dryer as opposed to electric dryers are pointed out. It is also shown that the majority of dryers sold are going into low or medium priced homes, and therefore cannot be considered a luxury item. E. F. Searight

Combustion Controls

Cesaro, R. S. and Koenig, R. J. TEMPERATURE SENSING DEVICE. U. S. 2,638,784 (1953) May 19.

Cone, C. and Dailey, W. H. Jr. (assigned to Surface Combustion Corp. COMBUSTION APPARATUS USING PREHEATED AIR. U. S. 2,639,910 (1953) May 26.

Cubberly, A. H. HEATING CONTROL SYSTEM. U. S. 2,639,095 (1953) May 19.

Squier, D. R. (assigned to Specialties Development Corp.) METHOD OF MAKING HEAT OR FLAME DETECTING ELEMENTS. U. S. 2,639,247 (1953) May 19.

Lamp-Stove

Guedon, N. COMBINATION MANTLE LAMP AND GAS STOVE. U. S. 2,638,085 (1953) May 12.

Space Heating

Ciricillo, S. F. (assigned to General Electric Co.) GAS FURNACE AND DRAFT HOOD ASSEMBLY. U. S. 2,639,706 (1953) May 26.

Earle, G. L. COMBINATION SPACE AND WATER HEATER AND INCINERATOR UNIT. U. S. 2,638,891 (1953) May 19.

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Dirksen, H. A. NATURAL GAS SUBSTITUTES BY AUTOHYDROGENATION. p. 119

Searight, E. F. INFLUENCE OF OPERATING VARIABLES UPON SUBSTITUTABILITY OF HIGH-BTU OIL GASES. p. 120

3. COMBUSTION AND INDUSTRIAL FURNACES

Fuel Beds

Silver, R. S. THEORETICAL TREATMENT OF COMBUSTION IN FUEL BEDS I—GAS COMPOSITION AND HEAT RELEASE. *Fuel* (British) 32, 121-137 (1953) April.

Starting with six basic assumptions the author develops a set of equations to estimate heat release, gas composition, and fuel bed thickness. The results obtained by using the equations correlate with observed and experimental results. G. V. Vosseller

Silver, R. S. THEORETICAL TREATMENT OF COMBUSTION IN FUEL BEDS II—TEMPERATURE ATTAINED IN COMBUSTION. *Fuel* 32, 138-150 (1953) April.

A general method is presented for estimating the mixed gas temperature and solid surface temperatures of burning fuel beds. The relationship of fire bed temperature and efficiency is discussed. Also presented are equations for estimating the correct order of magnitude of conditions for ignition. G. V. Vosseller

Gas Engine Power

Bayerlein, R. W. GAS-BURNING ENGINES OFFER LOW COST, EFFICIENT POWER GENERATION. *Gas Age*, 111, 46-50, 92-94 (1953) March 12.

Article describes Norberg 2-cycle vertical-shaft gas-burning radial engines for electric power generation. They are built with 11 or 12 cylinders of 14-inch bore and 16-inch stroke, develop up to 2125 h.p., 1500 kw. at 400 rpm. Fuel consumption is at the rate of 10,500 Btu./kw.-hr. (LHV). Operating costs are given for fuel, lubricating oil, maintenance, and labor personnel for large multi-engine installations. Information is derived from data on 120 engines which have been in service for an average of 20,000 hours each. Author states that these engines "furnish electrical energy at a cost per kilowatt hour comparable and in some cases lower than hydro or steam generated power". Principal use of these engines has been direct-current power generation for electrolytic reduction of aluminum. P. R. Trumpler

Metal Melting

GAS IN THE NON-FERROUS METALS INDUSTRY. *Ind. Gas* (British), **16**, 196-208 (1953) April.

Construction of a 7½ ton immersion-tube stereotype-metal melting pot is described. Test results are tabulated. G. Engholm

Static Fires

Beach, R. INDUSTRIAL FIRES AND EXPLOSIONS FROM ELECTROSTATIC ORIGIN. *Mech. Eng.*, **75**, 307-13 (1953) April.
A rather complete general discussion of fires and explosions from electrostatic origin is presented. W. J. Pleticka

Textile Printing

Hunt, R. E. AUTOMATIC GAS HEAT ASSURES HIGH QUALITY IN SILK SCREEN PRINTING OF TEXTILES. *Ind. Gas*, **31**, 10, 11, (1953) April.

This process requires careful temperature control of a 110,000 cu.ft. room. This job is performed by a No. 225 Janitrol duct-type unit heater. E. F. Searight

Wood Fuels

Anders, M. F. TO BURN WOOD EFFICIENTLY CHOOSE PROPERLY DESIGNED COMBUSTION CHAMBER. *Power*, **97**, 90-93 (1953) April.

A review of principles of combustion as applied to the utilization of Western waste woods as boiler fuels in lumber and paper mills. Properties of the various woods and their burning behavior are discussed. The conventional (natural draft) and the producer-gas (positive pressure) types of dutch-oven furnaces are described, and typical test results are tabulated. Costs per 1000 lb. steam are: 40¢ for wood in conventional oven, 26¢ for wood in producer-gas oven, and 52¢ for No. 6 fuel oil ($2.27/bbl.). O. P. Brysch

4. CARBONIZATION AND GASIFICATION

Catalytic Autohydrogenation

Dirksen, H. A. and Pierson, C. E. PRODUCTION OF NATURAL GAS SUBSTITUTES BY CATALYTIC AUTOHYDROGENATION OF HIGH-BTU OIL GASES. Paper No. PC-53-11, Am. Gas Assoc., Operating Section, New York, May, 1953.

A study to develop methods for increasing the substitutability of high-Btu oil gases for natural gases by catalytic autohydrogenation: reacting the hydrogen in the oil gases with the unsaturates of the oil gases to form additional paraffin hydrocarbons was undertaken. The work to date has been conducted 1) to find a suitable catalyst for autohydrogenation; 2) to define a suitable temperature range; 3) to determine the relationship between throughput rate and extent of autohydrogenation; 4) to evaluate the substitutability of autohydrogenated oil gases for natural gas, and 5) to determine the effects of feed composition, specifically, of the hydrogen to unsaturates ratio and of sulfur compounds upon catalyst activity and life. Autohydrogenation significantly increased the substitutability of oil gases, as tested by the Institute on the seven critical appliance burners used in its interchangeability study.
Authors' Abstract

Coal Constitution

Dryden, I. G. and Griffith, M. QUANTITATIVE ESTIMATION OF THE CHANGES IN CHEMICAL STRUCTURE OF COALS DURING METAMORPHISM. *Fuel* (British), **32**, 199-210 (1953) April.

Values of the 'ring condensation index' deducted by D. W. van Krevelen from the ultimate analyses and densities in helium of a series of bright coals have been interpreted, in combination with the hydrogen-carbon ratios and subject to assumptions indicated, in terms of quantitative structural formulae for 'cluster units.' The molecule may consist of one or more such units, each containing a fused-ring nucleus. Examples for hypothetical average coals in the bituminous to anthracite range are given.

The formulation of these units has enabled minimum molecular weights to be estimated. Methods of further restricting the number of possible chemical structures are suggested.

Authors' Abstract

CO_2 Removal

Peters, A. W. (assigned to Surface Combustion Corp.) APPARATUS FOR PURIFYING PRODUCTS OF COMBUSTION. U. S. 2,635,039 (1953) April 14.

An apparatus for purifying products of combustion is described. It relates principally to the absorption of CO_2 in ethanolamine solution.

E. F. Searight

Industrial Hydrogen

Hasche, R. L. (assigned to Eastman Kodak Co.) MANUFACTURE OF HYDROGEN. U. S. 2,635,948 (1953) April 21.

A regenerative system for large-scale production of CO-free, 83-99% pure industrial hydrogen by means of the conventional "steam-iron" process is described. CO-free waste gases containing 10-15% hydrogen (balance N_2) are used to reduce the iron oxide back to metallic iron. High production rate and good heat economy are achieved by a special design of the two regenerators. Ten claims are listed.

S. Hu

Reed, H. C. and Berg, C. H. (assigned to Union Oil Co. of California). HYDROGEN PROCESS. U. S. 2,635,947 (1953) April 21.

This patent covers a new equipment for the continuous production of pure hydrogen in a fluidized system. Lower oxides of metals above hydrogen in the electrochemical series are used to reduce steam in a hydrogen generator and the resulting higher oxides are coked with a low API gravity hydrocarbon and are eventually reduced to the lower oxides or the elemental form in a reducing regenerator. Any sulfur introduced by the hydrocarbon is removed from the system in an oxidizing regenerator. The operating temperature and pressure, as well as the amount of recirculating material for each unit are easily controlled. 17 features are claimed.

S. Hu

Oil Gas

Collier, R. T. METHOD FOR MAKING OIL GAS AND WATER GAS. U. S. 2,634,197 (1953) April 7.

An adaptation and modification of the original "upflow" fluid catalytic cracking process is described for use in the thermal cracking of heavy hydrocarbons to produce oil gas. Provisions are made for introduction of steam into a separate vessel through which the spent heat-transfer solids flow by gravity to produce water gas as a by-product of the process. Continuous operation with very heavy crudes and asphalts at 1800° to 2200° F cracking temperatures is claimed, accompanied by easy separation of the pyrolytic products.

J. M. Reid

Lawton, E. J. THE MANUFACTURE OF GAS FROM OIL. *Gas World* (British) 87, 578-580 (1953) February 28.

A brief description of the Semet-Solvey Oil gas processes (Poughkeepsie regenerative reverse flow) is given along with some typical plant operating results. In addition several other oil gas processes are very briefly discussed in view of their potentialities in England.

J. M. Reid

Searight, E. F. and Linden, H. R. INFLUENCE OF OPERATING VARIABLES UPON THE SUBSTITUTABILITY OF HIGH-BTU OIL GASES. Paper No. PC-53-10 Am. Gas Assoc., Operating Section, New York, May, 1953.

This paper presents the results of a study of the combustion performance of high-Btu oil gases, produced at various gasification pressures, when substituted for a high-methane natural gas on a group of seven critical appliance burners. It also presents a study of the effects of moderate pressure, over a wide range of severity of cracking, on the make-oil requirements, on oil gas and tar yields and compositions, and on carbon deposition, for a typical distillate and a typical residual oil. (See also abstract of Interim Report, Institute of Gas Technology, February 1953: *Gas Abs.* 9, 65 (1953) April).

Willien, L. J. THE SUBSTITUTABILITY OF HIGH-BTU OIL GAS FOR NATURAL

GAS IN AN EMERGENCY. *Gas Age*, 3, 70-75, 112 (1953) April 23.

Detailed analyses of four specific instances in which high-Btu oil gas was used during prolonged interruption of natural gas supplies are given. Type of gas, methods employed in manufacture and distribution, and substitutability results based on observations and customer complaints in each instance are described. In addition special reference is made to the Pacific Coast process for high-Btu oil gas and recent developments in oil gas conditioning techniques. J. M. Reid

Pressure: Oxygen Gasification

Von Fredersdorff, C. G., Pyrcioch, E. J. INFLUENCE OF OPERATING VARIABLES ON SYNTHESIS GAS PRODUCTION IN PRESSURE COAL GASIFICATION. Paper No. PC-53-21 Am. Gas Assoc., Operating Section New York, May, 1953.

Experimental work on the effect of the operating variables in suspension gasification of an Illinois high-volatile C bituminous coal has been conducted at the Institute of Gas Technology in a pilot pressure gasifier constructed and operated under American Gas Association (PAR Plan) sponsorship. This pilot unit, incorporating the IGT explosion pulverizer-cyclonizer coal conditioning system for coal feed rates of 500 lb/hr and above, operates with tangential introduction of the coal and gasifying steam in a downflow generator with pressures from two to five atmospheres. An analysis of the data indicated that the coal-steam oxygen ratio, oxygen concentration, and gasification pressure primarily determined the gas composition and conversion efficiencies of the process. Operating results showed that the carbon conversion increased almost linearly with oxygen-coal ratio, and the gas heating value, carbon conversion and thermal efficiency increased with both oxygen concentration and gasification pressure. Optimum results at a generator pressure of 5 atm. occurred between an oxygen-coal ratio of 0.80 to 0.85 lb/lb (9.4 to 10 SCF/lb), yielding a gas containing upwards of 80% combustibles and gasifying more than 90% of the carbon at a thermal efficiency of 70% and higher on the cold gas basis. Raw material requirements were as low as or lower than those reported for other powdered-coal gasification processes. Specifically, for the production of a 260 Btu synthesis gas using 90% oxygen enrichment, these requirements were found to be:

Coal	32	lb/Mcf CO + H_2
Steam	32	lb/Mcf CO + H_2
Air	45	SCF/Mcf CO + H_2
Oxygen	310	SCF/Mcf CO + H_2

The coal gasifier operated at ash-slagging conditions during the majority of the tests at oxygen concentrations of 50 to 90 mole percent, the ratio of fused ash to dry ash increasing with oxygen-coal ratio up to the point where nearly 80% of the coal ash was removed in fused form. The continuous explosion pulverizer-cyclonizer system operated successfully, yielding a pulverized product analyzing 70-80% passing a No. 200 U.S. sieve. The tangential introduction of the coal and steam streams in the upper portion of the gasifier, with subsequent downflow injection of oxygen, seemed a desirable arrangement in promoting a high conversion efficiency and in protecting the gasifier refractories from excessive radiation from the oxygen-coal flame. Authors' Abstract

Tar Dehydration

Linden, H. R. and Parker, R. THE CONTROL AND RESOLUTION OF HIGH-BTU OIL GAS TAR EMULSIONS. Paper No. PC-53-4, Am. Gas Assoc., Operating Section, New York, May 1953.

See abstract of Interim Report, Institute of Gas Technology, January 1953: (*Gas Abs.* 9, 65 (1953) April).

Lüpke, H. EIN NEUER WEG ZUR TEER-ENT-WAESSERUNG. (A NEW METHOD OF TAR DEHYDRATION.) *Brennstoff-Chemie* (German) 34, 1-11 (1953) January 21.

A novel tar dehydrator design used in processing coke-oven-tar emulsions is described. The emulsion flows downward on the inside surfaces of tubes heated externally by steam. Film-type flow is obtained by careful distribution of the emulsion with a V-notch weir. Countercurrent to the tar flow, stripping gas (coke oven gas in this case) is introduced to remove light oil and water vapors. H. R. Linden

Water Pollution

Hebley, H. F. STREAM POLLUTION BY COAL MINE WASTES. *Mining Eng.* 5, (Trans. A.I.M.E.) (1953), 404-12, April.

Great expansion of industry and population has increased the demand for water to a tremendous extent. Rapid lowering of the ground water level and serious water famines in many localities have forced a country-wide study of this serious problem. Pollution of water supplies by drainage from coal mining operations, long tolerated in the interests of local industrial development, has now attained the stage where vast expenditures are necessary to ensure the purity needed for health and industrial operations. The Ohio Basin estimate of 2.5 million tons of sulfuric acid drainage per year in 1940 exemplifies the magnitude of the problem. Besides neutralization or abatement of such acid drainage the factors of sludge settling, hardness, washery silts, soil erosion and human sewage also require considerable investigation on a State, regional and national level, and the coal mining industry will be vitally occupied in the solution of this problem. O. P. Brysch

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Carbon Black

Jordan, M. E. (assigned to Godfrey L. Cabot, Inc.) PELLETIZED CARBON BLACK AND PROCESS OF MAKING. U. S. 2,635,057 (1953) April 14.

A pelletized dustless carbon black can be made by the addition of oil, water and a surface active agent. The product is suitable in all respects for use in the news-ink industry. D. V. Kniebes

Compression

Clark, B. THREE BOOSTER STATIONS DOUBLE "SUPER-INCH" CAPACITY. *Gas*, 29, 105, 107, 110, 112, 115, 117 (1953) April.

The description of the existing facilities and the proposed expansion of the three key compressor stations at Topock, Hinkley and Kettleman Hills, California, on a 34-inch line constructed by Pacific Gas & Electric Company.
I. P. Patel

Conservation

Resen, F. L. GAS FLARING REDUCED. *Oil Gas J.*, 51, 84 (1953) April 13.

Gas flaring in south Louisiana has been reduced 40% in the last 18 months due to increased utilization via new pipe lines, new carbon black plants, and for injection. D. M. Mason

Dust Removal

Glamser, J. H. CONTROL OF DUST IN DISTRIBUTION SYSTEMS. *Am. Gas J.*, 178, 42, 64, 65 (1953) May.

The source of natural gas pipeline dust is mill scale, internal corrosion of the pipeline system, well sand and construction dirt. Some of the effects of dust are to render regulators inoperative, destroy accuracy of meters and to throw gas burners in domestic appliances out of adjustment. Some methods for eliminating dust are: dehydration, and the blowing and pigging of old and new transmission lines. Some of the points at which accumulated dust in lines can be removed are: intermediate points in the transmission system; plant district regulators and at meters or customer source. The principal types of equipment for dust removal are: filters, liquid scrubbers, rotating vane scrubbers, and cyclone scrubbers. The conversion to natural gas of systems which previously carried wet manufactured gas requires that the natural gas be scrubbed to prevent dust from entering system. The gas must also be humidified and oil fogged to prevent drying out of lines.
E. J. Pyrcioch

Wilson, B. W. THE TURBOCYCLONE: A NEW METHOD FOR SEPARATING FINE PARTICLES FROM GAS STREAMS. *Australian J. Appl. Sci.*, 4, 47-57 (1953) March.

A centrifugal separator known as a "turbocyclone" for the removal of small particles from gas streams is described. The centrifuge consists of two concentric rotating sleeves with the gas being admitted to the annular space between the sleeves and accelerated by a series of turbine blades. The particles move toward the outer casing and are carried away by a liquid film. Laboratory tests showed that particles as fine as 0.5 micron could be separated but the efficiency for sizes less than 1.5—2.0

microns fell to 50 per cent. The removal of particles from the centrifuge following separation from the gas stream is the limiting factor in the application of the turbocyclone. The pilot model could be used for continuous operation only on liquid droplets or soluble solid particles. E. J. Pyrcioch

Ethane Pyrolysis

Carpenter, R. A. and Fowler, F. C. CORRELATING ETHANE PYROLYSIS DATA. *Petroleum Refiner*, 32, 153-154 (1953) April.

New data on the conversion of ethane to ethylene is presented. The graphic correlation enables calculation of reaction conversion for any reasonable temperature-contact time combination. From the available data the reaction does not appear to be a simple first-order reaction. H. A. Dirksen

European Gas

NATURAL GAS FOR EUROPE. *Coke and Gas* (British), 15, 126-128, 139 (1953) April.

A discussion of the economic and political factors involved in the possible use of Middle-Eastern natural gas in Europe. It may be doubted that Europe will use this source of natural gas so long as the political picture remains clouded and uncertain. R. F. Bukacek

Field Processing Costs

Kilgren, E. W. and Miller, C. S., Jr. A SHORT CUT TO GASOLINE AND CYCLING-PLANT COSTS. *Oil Gas J.*, 51, 144-152, 201 (1953) April 27.

Presented are two short-cut methods by which field-processing plant costs can be estimated in a very quick and reasonably accurate manner. Forms and graphs for the calculations are included in a complete presentation of the methods. B. E. Eakin

Gas Demands

Bruns, R. A., Jr. WHAT CAN BE DONE WITH DUMP LOADS, INTERRUPTIBLES AND HEATING. *Gas Age*, 111, 52, 53, 92 (1953) April 9.

Several methods are presented by which demand charges on natural gas used for send-out purposes can be kept down. These include the building of peak shaving plant, selling off-peak and interruptibles, promoting dual-fuel use and underground storage of gas. E. J. Pyrcioch

Gasoline Recovery

McLaughlin, R. B. and Stanley, C. P. GAS REFRIGERATION PLANT DESIGNED TO EXTRACT MINIMUM OF NATURAL GASOLINE. *Oil Gas J.*, 51, 103-106 (1953) April 6.

The Northern Natural Gas Co. refrigeration plant at Holcomb, Kansas, was designed to extract a minimum of natural gasoline in order to maintain the heating value of the high nitrogen gas which is processed, and still prevent condensation in the pipe line which extends into Minnesota. D. M. Mason

Reidel, J. C. RAW-LIQUIDS GATHERING SYSTEM, LARGEST SUPERFRACTIONATION PLANT. *Oil Gas J.*, 51, 168-172 (1953) April 27.

Phillips Petroleum Company collects about 25,000 gal. of natural gasoline daily by 2,000 miles of gathering system and feeds this to the Borger fractionator. Here besides paraffin fractions from propane to isooctane, they separate directly cyclohexane. Some special processes carried out in the Rice plant include isomerization of normal butane, cracking of normal butane to ethylene, and manufacture of DIP (diisopropyl) alkylate. I. P. Patel

H_2S Removal

Miller, F. E. and Kohl, A. L. SELECTIVE ABSORPTION OF HYDROGEN SULFIDE. *Oil Gas J.*, 51, 175-183 (1953) April 27.

The results of a commercial-scale test using a 20% aqueous solution of methyl-diethanolamine for the selective removal of hydrogen sulfide from refinery gas containing carbon dioxide are presented. Regeneration of the solution, solution deterioration, and plant corrosion are also discussed. A reduction in the cost of methyldiethanolamine (now 2½ times that of diethanolamine) is expected if this amine is applied commercially. C. E. Hummel

Zankl, W. MOEGLICHKEITEN UND GRENZEN DER SCHWEFELWASSERSTOFF-ENTFERNUNG BEI DER AMMONIAK-WAESCHE. (POSSIBILITIES AND LIMITS OF HYDROGEN SULFIDE REMOVAL BY AMMONIA WATER WASHING). *Gas- und Wasserfach* (German), 94, 178-180 (1953) April 1.

Data on the effect of type of scrubber, water-to-gas ratio, and concentration of ammonia on the preferential absorption of hydrogen sulfide in the presence of carbon dioxide are presented and discussed. D. M. Mason

Odorization

Girelli, A. SULLA ODORIZZAZIONE DEL GAS NATURALE. (THE ODORIZATION OF NATURAL GAS). *Rivista Combustibili*, (Italian) 7, 142-154 (1953) March.

This article treats the principles of odorization, selection of the odorant, and the determination of the odor level of the gas.
C. E. Hummel

Sulfur Recovery

Graff, R. A. SULFUR RECOVERY PRACTICES IN OIL INDUSTRY. *Petroleum Eng.*, 25, C19, C22-C24 (1953) April.

Technical aspects of the modified Claus process for conversion of hydrogen sulfide to elemental sulfur are discussed. D. M. Mason

Utah Exploration

Kornfeld, J. A. CENTRAL UTAH GAS SEARCH INTENSIFIES EXPLORATION. *Oil Gas J.*, 51, 174, 76, 77 (1953) April 13.

To date seven gas wells have been completed from various lenses in the Ferron Sandstone series. Currently three rotary drills are active on the Clear Creek structure. Proved developed natural-gas reserves are estimated at 290 billion CF or possibly more. D. C. Gami

Underground Storage

de Mey, C. F. and Roth, E. E. COLUMBIA SYSTEM USES UNDERGROUND STORAGE TO TURN ADVERSITY TO ADVANTAGE. *Gas Age*, 111, 45-49 (1953) April 23.

A discussion of Columbia System's underground storage and the various factors that make such storage of interest to the gas industry.
R. F. Bukacek

Wobbe Index

Minchin, L. T. THE GAS QUALITY POSITION IN GREAT BRITAIN. *Gas World* (British), 87, 972-74 (1953) April 11.

In this article the author suggests the gas industry would give better service to the consumer if works were to control not calorific value but "Wobbe Index" which, he says, should replace C. V. as a standard of gas quality. He also declares that, if a "G number" (or range of Wobbe index) could be specified for a given area, it would assist appliance manufacturers considerably. Further, the author shows the latest gas qualities based on G numbers throughout the Area Gas Boards. Author's Abstract

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Aromatics Recovery

Shuman, F. R. and Brace, D. G. SEPARATING AROMATICS BY THE AROSORB PROCESS. *Oil Gas J.*, 51, 109-113 (1953) April 6.

A new process is described in which pure aromatic compounds ranging from benzene to heavy solvent are separated from paraffin and naphthene reformed feeds. The aromatics are adsorbed from the charging stock in a silica-gel packed column and are subsequently stripped with a saturate liquid such as pentane or butane. Separation of the aromatics from the saturate liquid is accomplished by distillation. Plant operation of the "Arosorb" process is discussed giving economic and equipment-design information. J. M. Reid

Catalytic Hydrogenation

Mills, I. W. and Johnson, H. L. (assigned to Sun Oil Co.) MOLYBDENUM DISULFIDE ON

A SPENT CRACKING CATALYST. U. S. 2,635,081 (1953) April 14.

An improved hydrogenation catalyst suitable for the hydrogenation of hydrocarbon oils is described. The catalyst consists of approximately 20% molybdenum disulfide deposited on a spent silica-alumina cracking catalyst. The spent cracking catalyst is more active than a fresh silica-alumina. H. A. Dirksen

Pelipetz, M. G., Salmon, J. R., Bayer, J. and Clark, E. L. CATALYST-PRESSURE RELATIONSHIP IN HYDROGENOLYSIS OF COAL. *Ind. Eng. Chem.*, **45**, 806-09 (1953) April.

Hydrogenation of bituminous coal was carried out at 400°C and pressures ranging from 500 to 4000 psig over two catalysts; tin sulfide plus ammonium chloride and molybdenum conversion, measured as organic benzene-insolubles remaining, was plotted against time to give hydrogenation rates for the two catalysts. Methematical relationships were thus derived for hydrogenation reaction rates in terms of hydrogen pressure and are presented together with the experimental data. J. M. Reid

Gas Injection

Slobod, R. L. and Koch, H. A., Jr. WHICH TO USE — "I" TYPE OR "M" TYPE. . . . IN HIGH-PRESSURE GAS INJECTION? *Oil Gas J.*, **51**, 84-88, 115-17 (1953) April 6.

This article summarizes the latest mechanistic concepts of Atlantic Refining's high-pressure gas-injection process. The increase in displacement efficiency when operating in the miscibility range is explained, as well as to which types of reservoirs the new method will be applicable. The theory is very concisely presented. B. E. Eakin

Production

Clark, N. J. IT PAYS TO KNOW YOUR PETROLEUM. *World Oil*, **136**, 208-210, 213 (1953) April.

A comparison of liquid shrinkage through flash and differential liberation reveals the optimum production condition of a reservoir. Sampling, testing gas liberation and retrograde condensation are discussed. The conclusions are supported by experimental data supplied by J. C. Allen. I. P. Patel

Dougherty, T. DRILLING PROBLEMS IN THE WILLISTON BASIN. *World Oil*, **136**, 148, 150 (1953) April.

A review of the certain problems peculiar to the Williston Basin and the drilling procedures evolved. B. E. Eakin

Residual Oils

WHERE "RESIDUALS" ARE HEADING. *Petroleum Processing*, **8**, 521-524 (1953) April.

Due to leveling off of residual oil production and markets, this by-product of petroleum refining is expected to remain fairly stable in the foreseeable future. Data on domestic and import residual production and consumption for the period of 1946 through 1951 is cited from a recent report on Bunker "C" fuel oil by the National Petroleum Council. J. M. Reid

Shale Oil Gasoline

Berg, L. (assigned to Phillips Petroleum Co.) CATALYTIC CONVERSION OF SHALE OIL HYDROCARBONS. U. S. 2,635,987 (1953) April 21.

A process to produce a color stable gasoline from shale oil is claimed. The process comprises contacting a gas oil fraction with an alumina base cracking catalyst in the presence of a gaseous hydrocarbon from C_1 to C_4 at temperatures from 200-700°F and pressures from 300 to 2500 psi. H. A. Dirksen

Shale Oil Retort

Brakel, L. H. MECHANICAL DESIGN IN OIL-SHALE RETORTING PLANTS. *Am. Soc. Mech. Eng., Trans.*, **74**, 441-451 (1953) April.

Tests and studies by the Bureau of Mines at Rifle, Colorado, have shown that the gas-combustion process for retorting shale is the most promising from an efficiency and economic standpoint. A 300-ton/day demonstration-scale plant using this process is described. The retort

is rectangular in shape with the shale flowing by gravity through the retort and combustion air and recycle gas being admitted at the bottom through air-gas mixers. No meter is required for the process. Simplicity of design, low construction and operating costs are claimed. E. J. Pyrcioch

Reed, H. C. and Berg, C. ENGINEERING FEATURES OF THE UNION OIL-SHALE RETORT. *Am. Soc. Mech. Eng. Trans.* **75**, 453-457 (1953) April.

A description of Union Oil Co.'s oil-shale retort in which the raw shale is fed in the bottom, reaction air is drawn in the top, and make-gas and shale oil drawn off the middle portion of the reactor. Typical yields and product properties are given from the pilot operation of a 50-ton/day unit in 1950. W. G. Bair

Synthesis

Clark, A. (assigned to Phillips Petroleum Co.) FISCHER-TROPSCH CATALYST PREPARATION AND REGENERATION. U. S. 2,636,011 (1953) April 21.

An improvement of an iron oxide catalyst for the synthesis of hydrocarbons is claimed. The improvement comprises contacting the promoted iron catalyst with carbon dioxide for at least 5 hrs. at 250-350°C. This results in the reduction of waxy deposits on the catalyst surface. H. A. Dirksen

McGrath, H. G. (assigned to The M. W. Kellogg Company) SYNTHESIS OF ORGANIC COMPOUNDS. U. S. 2,637,739 (1953) May 5.

A synthesis reactor and catalyst is described for conducting Fischer-Tropsch reactions in a fluidized bed. Cobalt or nickel catalysts on a silica gel-alumina support with or without metallic oxides (thoria) are claimed to give improved contraction. J. M. Reid

Rottig, W. (assigned to Ruhrchemie Aktiengesellschaft) IRON CATALYST FOR THE HYDROGENATION OF CARBON MONOXIDE. U. S. 2,628,969 (1953) February 17.

A catalyst and suitable conditions are claimed for the hydrogenation of carbon monoxide to produce substantially oxygen-containing compounds. The reaction is carried out at from 3 to 20 atmos. and 200°C over a hydrogenation catalyst comprising a reduced iron oxide-alkali metal salt precipitation product (5 to 10 percent alkali calculated as K_2O). H. A. Dirksen

Watson, C. W. (assigned to The Texas Co.) REGENERATION OF HYDROCARBON SYNTHESIS CATALYSTS. U. S. 2,635,110 (1953) April 14.

An improved continuous method of revivification wherein the catalyst may be treated to remove carbon deposits and returned to the reaction with suitable activity. The catalyst is subjected to elevated temperatures (1500°F) in the presence of carbon dioxide to produce carbon monoxide, cooled and returned to the reactor. H. A. Dirksen

Egloff, G. PETROCHEMICALS UNLIMITED. *Oil Gas J.*, **51**, 124, 126-29, 135, (1953) April 13.

The petrochemical industry which presently represents an investment of over 2 billion dollars has enormous opportunities for expansion as the field of their application is almost limitless. Major classes of petrochemicals, their present production and utilization, and their future prospects as related to the petroleum refiner are discussed generally. J. M. Reid

Synthesis Gas

d'Ouville, E. L. (assigned to Standard Oil Co.) MANUFACTURE OF HYDROGEN-CARBON MONOXIDE MIXTURE. U. S. 2,635,952 (1953) April 21.

A two-step conversion of methane to synthesis gas with oxygen that eliminates carbon deposition by (1) reacting oxygen with synthesis gas to produce steam and carbon dioxide and then (2) reacting methane with the products of (1) to give carbon monoxide and hydrogen. It is claimed that such a path eliminates carbon deposition by better temperature control. G. V. Vosseller

7. ANALYTICAL METHODS AND TESTS

Air Pollution

Larson, G. P., Fischer, G. I. and Hamming, W. J. EVALUATING SOURCES OF AIR POLLUTION. *Ind. Eng. Chem.*, 45, 1070-1074 (1953) May.

Quantities of various air pollutants generated in the Los Angeles area during 1940, 1948, and 1951 have been estimated from production and other operations figures; important sources of locally discharged pollution have been evaluated; and the relation to levels of specific pollutants in the general air of the city has been explored. Carbon monoxide level found in the general air was assumed to derive from estimated emission. The necessary dispersion volume to yield the measured concentration in air was calculated. This factor was applied to estimated discharge of other gases and aerosols from the operations of the area and general air levels were calculated. Within order-of-magnitude, agreement with air analysis was found. Authors' Abstract

Carbon Monoxide Poisoning

Schrenk, H. H. CONTINUING INVESTIGATIONS OF CARBON MONOXIDE POISONING PARALLEL NEW INDUSTRIAL EXPOSURES. *Ind. Eng. Chem.*, 45, 119A, 120A, 122A (1953) April.

The physiological action of carbon monoxide is described. The discussion includes current findings in regard to acute and chronic poisoning. A new spectrophotometric method of determining carbon monoxide in blood is outlined.
C. E. Hummel

Coal Moisture

Brown, G. M. THE DETERMINATION OF MOISTURE IN COAL. *Nat. Gas Bull.* (Australia), 17, 14-21 (1953) January-February.

Available methods for the determination of moisture in coal are summarized and their advantages and disadvantages listed. The xylene distillation method is accurate but lacks the speed and simplicity of the oven-drying method. The oven-drying method is unreliable because of absorption and oxidation. The author concludes that there is an urgent need for an acceptable method for the accurate determination of miosture in coal, since on this analysis depends the estimation of hydrogen and calorific value and the interpretation of most other coal analyses. D. J. Dennison

Contact Apparatus

Reeder, W. H. (assigned to Fisher Scientific Co.) LIQUID-GAS CONTACT APPARATUS. U. S. 2,628,159 (1953) February 10.

This apparatus provides for automatically contacting gas with liquid by forcing liquid through a nozzle into a gas chamber. This is effected by means of a plunger attached to a metal core which is raised and lowered periodically by a solenoid coil. Application to Orsat-type gas analyzers is suggested by the inventor.
C. E. Hummel

Distillation Analysis

Preston, S. T., Jr. CORRECT LTFD ANALYSIS FOR VAPOR HOLDUP. *Petroleum Refiner*, 32, 142-44 (1953) April.

Vapor holdup between thermocouple and shut-off valve is a source of error in low temperature fractional distillation. The amount of holdup in automatic and semi-automatic apparatus has been measured by a new method which takes account of column pressure and temperature. A graph showing these corrections, and examples of their application are presented.
D. M. Mason

Gas Titrations

Katz, S. and Barr, J. T. GAS TITRATIONS. *Anal. Chem.*, 25, 619-624 (1953) April.

Gas phase reactions resulting in pressure changes are used in the analysis of halogens, hydrocarbons, and ammonia mixtures. Enough unknown material to fill a 5 liter volume at 0 to 50 mm Hg pressure is all that is required; however, this method has many limitations which are discussed in the article. S. Mori

Mass Spectrometer

Kniebes, D. V., Neuzil, J. E., Olson, G. C. THE UTILITY OF THE MASS SPECTROMETER IN GAS INDUSTRY ANALYSES. Paper No. PC-53-15, Am. Gas Assoc., Operating Section New York, May 1953.

The principle of operation and uses of the mass

spectrometer are described with emphasis on the analysis of gases and liquids associated with the utility gas industry. Analyses of typical liquid and gas products are listed.

D. V. Kniebes

Organic S Determination

Hall, M. E. POLAROGRAPHIC STUDIES OF SULFUR COMPOUNDS IN PETROLEUM FRACTIONS. *Anal. Chem.*, 25, 556-561 (1953) April.

Because the effect of sulfur compounds on refinery process and product quality varies widely with the type of sulfur compound, it has become important to have analytical methods to detect and determine the sulfur compound types most common to the petroleum industry. Elemental sulfur, aliphatic and aromatic disulfides, tert-butyl trisulfide, and tert-butyl polysulfide give characteristic reduction waves with the dropping mercury electrode. Analytical methods, including electrolytes, solvents, and interferences, are discussed for each type when they exist in various mixtures. Using an electrolyte solvent consisting of 40% isopropyl alcohol, 40% methanol, 20% water, and 0.025 M tetra-n-butyl ammonium hydroxide, tert-butyl polysulfide gives three waves, one of which is unaccounted for at present. In this same medium aliphatic sulfides and diphenyl sulfide were not found reducible up to -2.6 volts. The most useful application of the polargraph has been the study of sweetening processes, where mercaptans are converted to disulfides and other types of sulfur compounds.

Author's Abstract

Rulfs, C. L. and Mackela, A. A. AMPEROMETRIC ORGANIC SULFUR PROCEDURE. *Anal. Chem.*, 25, 660-62 (1953) April.

An amperometric end-point has been applied for the indirect micro determination of sulfur in organic compounds. A Carius digestion using lead nitrate as the precipitant is employed. The lead sulfate is dissolved, and the resulting solution of lead ion is titrated amperometrically with standard bichromate solution. Precision and accuracy are approximately equal to those of the gravimetric method. D. M. Mason

8. GENERAL AND PHYSICAL CHEMISTRY

Ammonia Properties

Grahl, E. R. THERMODYNAMIC PROPERTIES OF AMMONIA AT HIGH TEMPERATURES AND PRESSURES. *Petroleum Processing*, 8, 562-565 (1953) April.

Using experimental data from the literature, enthalpy and specific heat of ammonia for temperatures from -100°F to 700°F and pressures from 0 to 16,000 psia are calculated.

D. C. Gami

Burning Velocity

Manson, N. EFFECT OF PRESSURE ON THE FUNDAMENTAL BURNING VELOCITY IN GASEOUS MIXTURES. *Fuel* (British), 32, 186-195 (1953) April.

The theory developed in this article predicts a variation of the burning velocity with pressure according to the law: $V = VO\ (P^o/P)^n$. The index "n" depends on the nature and composition of the mixture and for rich and stoichiometric hydrocarbon mixtures with air is approximately 0.25. For lean mixtures it is between 0.30 and 0.40 and for mixtures with oxygen it is 0.1. The theory fails to explain the rapid decrease in burning velocity at very low pressures. A. R. Khan

Ethylene Purification

Ray, G. C. (assigned to Phillips Petroleum Co.) SELECTIVE REMOVAL OF ACETYLENE FROM HYDROCARBON STREAMS. U. S. 2,636,911 (1953) April 28.

A method is claimed for removing acetylene from ethylene and ethylene-containing gas streams by passing the gas over an ammonium phosphomolybdate catalyst at atmospheric pressure and 350° to 700°F. at space velocities in the range of 100 to 500. Complete removal of acetylene with no destruction of ethylene is claimed. J. M. Reid

Gas Permeability

Huckins, H. E. and Kammermeyer, K. THE SEPARATION OF GASES BY MEANS OF POROUS MEMBRANES. *Chem. Eng. Progress*, 49, 180-184 (1953) April.

The permeabilities of several gases were meas-

ured using porous glass as a diffusion medium. It was found that for hydrogen, helium, methane, oxygen and similar gases, the permeabilities were independent of the average pressure and agree with the theoretical values for molecular or Knudsen flow. In the case of propane, butane and other vapors near the critical temperature at normal atmospheric conditions, nonconformance with the theoretical values of permeability suggests the existance of adsorbed flow. Experimental permeability data for the gases investigated are presented in tabular and graphical form. J. M. Reid

Gas Solubility

Baldwin, R. R. and Daniel, S. G. THE SOLUBILITY OF GASES IN LUBRICATING OILS AND FUELS. *J. Inst. Petroleum* (British), 39, 105-124 (1953) February.

This paper describes briefly an apparatus devised for the measurement of the solubility of gases in oils, with particular reference to high viscosity oils. Results obtained for solubility of hydrogen, carbon dioxide, oxygen, nitrogen and air in a number of fuel oils and in a series of solvent-extracted oils derived from the same crude are discussed. Methods of predicting solubilities with the aid of current solubility theories are reviewed. D. M. Mason

Pressure Measurement

Johnson, D. P. and Newhall, D. H. THE PISTON GAGE AS A PRECISE PRESSURE-MEASURING INSTRUMENT. *Am. Soc. Mech. Eng. Trans.*, 75, 301-10 (1953) April.

A discussion of the errors encountered when measuring pressure, and a new piston gage design are presented. When accuracy greater than ½% is desired a check of the inherent instrument errors is necessary; a check list is included. The piston gage will change over a long period of time therefore the pressure required for the change of state of pure materials gives a primary check point. The melting pressure of mercury was determined at O°C using an experimental controlled-clearance piston gage and the results agree with Bridgman's value. W. W. Clauson

9. ORGANIC CHEMISTRY

Coronene

Orchin, M. and Feldman, J. THE ISOLATION OF CORONENE FROM A COAL-HYDROGENATION OIL. *J. Org. Chem.*, 18, 609-613 (1953) May.

Coronene has been isolated from the high-boiling portion of an oil produced by the hydrogenation of coal by co-distillation with polypropylene glycol of average molecular weight of 750. The distillation was conducted in a cyclic molecular still operating at 0.024 mm Hg pressure. The identity of the coronene was established by comparing its ultraviolet spectrum and its x-ray diffraction pattern with those of an authentic specimen. D. J. Dennison

Ethylene Oxide

Foster, A. L. NEW ETHYLENE OXIDE PROCESS. *Petroleum Eng.*, 25, C38-C39 (1953) April.

A fluidized bed process to make ethylene oxide with silver catalysts by the direct oxidation of ethylene is described. The process equipment is conventional but a novel reactor design permits accurate and rigid temperature control by elimination of "hot spots."

G. V. Vosseller

Isomerization

Weber, G. NEW REFORMING PROCESS. *Oil Gas J.*, 51, 131 (1953) April 27.

A platinum catalyst is to be used by Sinclair Refining Co. in a process for catalytic isomerization of paraffins and naphthenes, and the dehydrogenation of naphthenes to aromatics in a unit to be built at Marcus Hook in the near future. H. A. Dirksen

Petroleum Chemicals

Buck, M. PETROLEUM CHEMICALS: ACHIEVEMENTS AND AIMS OF THE INDUSTRY IN THE UNITED STATES. *Chem. Proc. Eng.*, 34, 97-98 (1953) April.

Major developments in the American petroleum chemicals industry, its sound basic raw material position and its use of all phases of technology are reviewed. Tremendous advances have been made to fill the demands of the chemical industry for more new products at min-

imum prices, to continue supplying the older products as cheaply as possible and thereby stimulate the development of new uses for them, and to fill gaps of supply by supplementing limited existing sources. R. A. Bambenek

Phenol Synthesis

Alm, R. M. (assigned to Standard Oil Co.) OBTAINING PURIFIED PHENOLS AND CRESOLS OF PETROLEUM ORIGIN. U. S. 2,635,120 (1953) April 14.

An improved process is claimed for the purification of cresylic acids recovered by caustic washing petroleum naphtha. By controlling the pH of the solution between 11 and 12.5 during the air blowing step, more effective removal of sulfur compounds is accomplished than heretofore. In addition the process is made less expensive by utilizing black refinery acid for neutralizing the solution to the proper pH.

J. M. Reid

Smith, F. M. (assigned to Phillips Petroleum Co.) PRODUCTION OF PHENOLIC COMPOUNDS. U. S. 2,632,027 (1953) March 17.

A process is claimed in which aromatic hydrocarbons are oxidized to the corresponding phenols by air in the presence of liquid HF, the phenols are removed from the product stream by extraction with aromatic solvent, and then adsorbed from the latter solution by silica gel. The silica gel is stripped by circulating aromatic solvent at a higher temperature, and the latter is distilled to recover phenol.

O. P. Brysch

10. CHEMICAL ENGINEERING

Condenser Design

Bras, G. H. DESIGN OF COOLER CONDENSERS FOR VAPOR-GAS MIXTURES-I. *Chem. Eng.*, **60**, 223-6 (1953) April.

A method is presented for the design of cooler condensers for mixtures of noncondensible gases and saturated or non-saturated vapors. The basis of the method is a relationship derived for dilute gas-vapor mixtures which, where applied graphically to a temperature-pressure diagram, gives the temperature-vapor pressure relation of the mixture as it passes through the cooler. A trial and error method is used for finding the temperature and vapor pressure of the condensate on the tube walls and the value of the unit heat transfer. The cooling area of the condenser is obtained by graphical integration. E. J. Pyrcioch

Fluidization

Sittig, M. FLUIDIZED SOLIDS. *Chem. Eng.*, **60**, 219-231 (1953) May.

A review of the basic fundamentals of fluidization with particular attention to reactor design. Many applications of fluidized beds in both the petroleum and chemical processing fields are given.

G. V. Vosseller

Heat Exchanger Costs

Michell, A. M. SHELL-AND-TUBE HEAT EXCHANGERS. *Chem. Eng. Costs Quarterly*, 3, 38-52 (1953), April.

A general cost review of all types of commercial heat exchangers. Cost increases when special construction materials are used such as the alloy steels. Cost of the fixed tube exchangers in all-steel construction is the lowest per unit of heat transfer area. Floating-head and packed-head units are considerably higher due to more complicated construction. W. G. Bair

Mass Transfer

Dryden, C. E., Strang, D. A. and Withrow, A. E. MASS TRANSFER IN PACKED BEDS AT LOW REYNOLDS NUMBER. *Chem. Eng. Progress*, **49**, 191-196 (1953) April.

This paper deals with the mass transfer from solid pellets of 2-naphthol and benzoic acid in packed beds to water flowing at low velocities in the surrounding voids. The data, covering the Re range of 10^{-2} to 10^{1}, have been correlated in terms of the Colburn j factor which was extended to cover the data found in the literature up to Re of 10^{4}. S. Hu

Piping Design

Wilbur, W. E. THERMAL STRESSES IN

PIPING SYSTEMS. PART II. *Petroleum Refiner*, 32, 163-168 (1953) April.

Part II of this three part article deals with calculation of stresses in 90°, 120°, and 130° lyre bends in pipe sizes from 2″ to 24″ diameter. Cold springing, connections to lines of different size, and stresses due to dead-loaded pipe are also evaluated. W. G. Bair

Reactors

Bonner, Z. D. (assigned to Gulf Oil Corp.) CATALYTIC PROCESS AND APPARATUS. U. S. 2,635,989 (1953) April 21.

An improved catalytic reactor is described for effecting even reactant distribution throughout a fixed bed of catalyst in vapor-liquid phase reactions. Distribution is accomplished by means of a centrally-located series of perforated conical sections fitted with stationary internal vanes which impart a swirling motion to the reactant feed stream. Elimination of liquid slugs and resultant high concentrations of coke and hot spots is claimed. J. M. Reid

Spray Drop-Size

Turner, G. M. and Moulton, R. W. DROP-SIZE DISTRIBUTIONS FROM SPRAY NOZZLES. *Chem. Eng. Progress*, 49, 185-190 (1953) April.

Drop-size distributions are determined by spraying liquid beta-naphthol and benzoic acid into cool air. The liquid was allowed to freeze, and was collected and the size of spray drop measured. An empirical modification of the logarithmic-probability function was developed to fit the experimental data. The data showed some deviation from the Nukiyama-Tanasawa and the Rosin-Rammler equation.

R. E. Peck

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Atmosphere Control

Sadler, W. W. VOLUMETRIC GAS ANALYZERS AND CONTROL DEVICES. U. S. 2,635,039 (1953) April 14.

A detailed description is presented of a device which can accurately and automatically control gases present in an incubator. The instrument analyzes the atmosphere and adjusts the deficiencies at regular set intervals.

R. Parker

Ejector Costs

SCHUTTE AND KOERTING STEAM JET AIR EJECTORS. *Chem. Eng. Costs Quarterly*, 52-58 (1953) April.

Capacity, steam consumption and cost data for Schutte and Koerting single- and two-stage steam-jet air ejectors are given.

E. J. Pyrcioch

Gas-Solids Metering

Farbar, L. THE VENTURI AS A METER FOR GAS-SOLIDS MIXTURES. Paper No. 52-A-31, *Am. Soc. Mech. Eng.*, November 1952.

The behavior of a venturi tube when metering gas-solids mixtures was investigated. A linear relationship was found between the venturi pressure differential and the solids flow rate. Indications are that the venturi can be used satisfactorily for metering gas-solids mixtures if it is calibrated in place. Additional investigation is required in order to determine whether the venturi flow constants can be predicted from the constants of the system.

E. J. Pyrcioch

Oxygen Indicator

Jacobson, M. G. ELECTROCHEMICAL METHOD FOR OXYGEN DETERMINATION IN GASES. *Anal. Chem.*, 25, 586-591 (1953) April.

A Mine Safety Appliance Co. oxygen indicator (model 2, type C) is described. Accurate results may be obtained in one minute after the introduction of the sample gas. A two percent accuracy is claimed between the two ranges of oxygen concentrations of 0 to 1%, and 0 to 25%. S. Mori

Pebble Heater

Goins, R. R. (assigned to Phillips Petroleum Co.) PEBBLE HEAT-EXCHANGER. U. S. 2,635,990 (1953) April 21.

A pebble heater is described with improved internal design to provide for more efficient contacting of reactants and pebbles in the heat exchange zone. W. G. Bair

Recording Manometer

Svec, H. J. and Gibbs, D. S. A RECORDING MERCURIAL MANOMETER FOR THE PRESSURE RANGE 0-760 MM OF MERCURY. *Rev. Sci. Instruments*, **24**, 202-204 (1953) March.

A mercury manometer is connected to a recording potentiometer in such a way that the pressure changes of 0-600 mm Hg resulting from a gaseous reaction are registered for the required time interval. This is particularly applicable for relatively slow reaction studies where the results of small pressure changes over a long period of time may be obtained without anyone's presence. S. Mori

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Johnson, D. P. PISTON GAGE AS A PRECISE INSTRUMENT. p. 129

Kniebes, D. V. MASS SPECTROMETER IN GAS INDUSTRY ANALYSES. p. 127

12. MATERIALS OF CONSTRUCTION

Corrosion Prevention

Senatoroff, N. K. HOW TO MITIGATE CORROSION.... IN A GLYCOL-DEHYDRATION PLANT. *Oil Gas J.*, **51**, 154-158, 201-204 (1953) April 27.

Corrosion reducing measures included incorporation of a vent-decanter tank to degasify the glycol stream and remove hydrocarbon liquids; reduction of liquid velocities and installation of filters to reduce scouring; equipment and process changes to reduce temperatures, use of corrosion inhibitors and corrosion-resistant materials. D. M. Mason

Pipe Coatings

Peifer, N. P. COMPARISON OF PLASTIC TAPE AND HOT ENAMELS FOR PROTECTIVE COATINGS OF PIPE. *Gas Age*, **111**, 41-43, 98, 100 (1953) May 21.

A summary of typical cost figures for the protection of pipelines by anodes, mill coated pipe, plastic tape and over-the-ditch coated pipe is given. Methods for evaluating tapes and coatings are given. G. V. Vosseller

Spencer, K. A. and Footner, H. V. PROTECTIVE COATINGS FOR BURIED PIPELINES. *Chem. and Ind.* (British) **19**, 448-455 (1953) May 9.

Various pipeline coatings, fillers, and coating practices are discussed in considerable detail. Two specifications for different enamels are given and attention is paid to wrapping material, metal surface, preparation and primers, hot enameling, enamel melting, rigs for coating application and test methods for coating. R. F. Bukacek

Plastic Pipe

Fugazzi, J. F. WHAT HAS THE GAS INDUSTRY EXPERIENCED TO DATE WITH PLASTIC PIPE? *Gas Age*, **3**, 54, 81, 82 (1953) May 7; *Canad. Gas J.*, **46**, 117-18 (1953) May.

In some 25,000 services no company has experienced failure of a plastic installation that could be attributed to the failure of the plastic pipe. Details of uses, materials, sizes and assemblies are presented in summary form. G. V. Vosseller

Weld Inspection

Fletcher, L. S. RADIOGRAPHIC INSPECTION ASSURES GOOD WELDS ON PROVIDENCE DISTRIBUTION LINE. *Gas Age*, **111**, 45-48 (1953) April 9.

Cobalt-60 was used for radiographic weld inspection on a 12-in. line installed under water for the Providence Gas Co. One faulty weld was detected out of 186 welds inspected. Had the line been placed, this defective weld would have resulted in expensive leakage, as well as raising and repair costs. W. G. Bair

13. NEW BOOKS

Cracking and Reforming

"CAT-CRACKING AND CAT-REFORMING". Collective reprint by *The Petroleum Engineer* (1953) May, Dallas, Texas.

Twenty-seven recently published articles on catalysis and catalysts and their application to processes in the oil and gas industries are presented as a 100-page collection. H. A. Dirksen

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Acta Crystallographica
American Chemical Society. Journal
American Documentation
American Gas Association Monthly
American Gas Journal
American Petroleum Institute Quarterly
American Society for Testing Materials Bulletin
American Society of Mechanical Engineers. Transactions
Analytica Chemica Acta
Analytical Chemistry
Applied Mechanics Review
Australian Journal of Applied Science
Australian Journal of Scientific Research

Bibliography of Technical Reports
Bituminous Coal Research
Blast Furnace and Steel Plant
Brennstoff-Chemie
British Abstracts
British Coal Utilization Research Association Monthly Bulletin and Quarterly Gazette
Butane-Propane News

California Oil World
Canadian Chemical Processing
Canadian Gas Journal
Canadian Journal of Chemistry
Canadian Journal of Physics
Canadian Journal of Technology
Chemical Abstracts
Chemical and Engineering News
Chemical and Process Engineering
Chemical Bulletin
Chemical Engineering
Chemical Engineering Costs Quarterly
Chemical Engineering Progress
Chemical Processing
Chemical Reviews
Chemical Society (London) Journal
Chemical Week
Chemist
Chemistry
Chemistry and Industry
Coal Heat
Coke and Gas
Combustion
Compressed Air
Construction Methods and Equipment
Corrosion

Electronics
Endeavour
Engineers' Digest

Faraday Society. Transactions
Fuel
Fuel Abstracts
Fuel Economy
Fueloil and Oil Heat

Gas
Gas Age
Gas and Oil Power
Gas Heat
Gas Journal
Gas News (Chicago)
Gas Research Board Publications
Gas Times
Gas und Wasserfach
Gas World

Heating and Ventilating
Heating, Piping and Air Conditioning

Independent Petroleum Association of America Monthly
Industrial and Engineering Chemistry
Industrial Finishing
Industrial Gas (American)
Industrial Gas (British)
Industrial Heating
Institute of Fuel (British). Journal
Institute of Petroleum (British). Journal
Institute of Gas Technology Publications
Institution of Gas Engineers. Bulletins, Communications and Transactions
Instruments

Journal des Usines a Gaz
Journal of Applied Chemistry
Journal of Applied Mechanics
Journal of Applied Physics
Journal of Chemical Education
Journal of Chemical Physics
Journal of Engineering Education
Journal of Metals
Journal of Organic Chemistry
Journal of Petroleum Technology
Journal of Physical Chemistry
Journal of Research (National Bureau of Standards)
Journal of Scientific Instruments
Journal of Southern Research

LP-Gas

Materials and Methods
Mechanical Engineering
Mining Engineering

National Fire Protection Association Quarterly
National Gas Bulletin
National Petroleum News
Nucleonics

Official Gazette of the U.S. Patent Office
Oil and Gas Journal
Oil, Paint and Drug Reporter
Optical Society of America. Journal

Paint and Varnish Production
Petroleum
Petroleum Engineer
Petroleum Processing
Petroleum Refiner
Physical Review
Physics Today
Pipe Line News
Power
Power Engineering
Public Utilities Fortnightly

Review of Scientific Instruments
Revista dei Combustibili
Revue generale du Gaz

Science
Southern Gas Association Progress
Southern Power and Industry
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